METHODS & TECHNIQUES

A Simplified Vacuum Apparatus for Collecting Small Nudibranchs

BY

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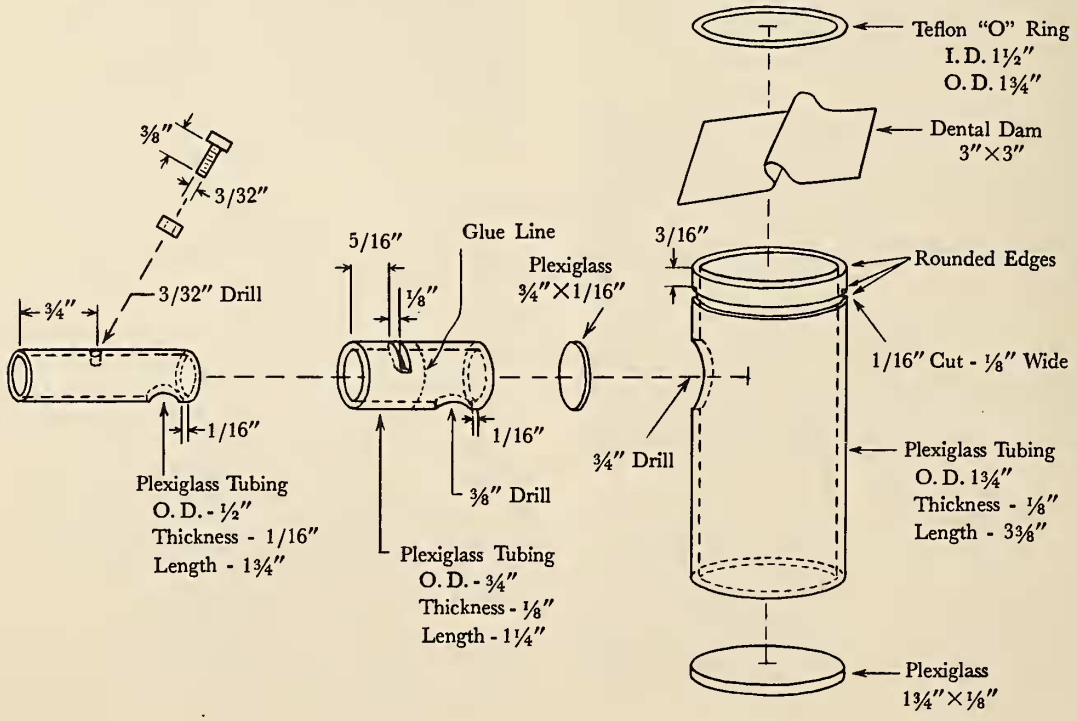
(1 Text figure)

If you have experienced the exasperation of collecting small aquatic organisms with a combination of forceps, eye dropper, screw-top jar, snap-lid vial, strainer and dip net, then you will appreciate the simplicity of the apparatus detailed in Figure 1. When a rubber sheet is attached over the open end of the cylinder, finger pressure on the rubber will displace air out of the tube at the side. If this spout is placed in water in the proximity of a small specimen and the pressure on the rubber released, the specimen will disappear from its habitat and reappear instantaneously in the cylinder. The specimen can be examined with a hand lens as it swims, crawls or attaches itself within the transparent cage. Additional specimens can be collected in the same cylinder as rapidly as your finger can **slowly depress** and **quickly release** the elastic cover of the container. This is a one-hand-only operation: holding the cylinder and depressing the top with the index finger. In cold water, neoprene diver's gloves can be worn without interfering with the efficiency of the technique.

Specimens can be transported to the laboratory in the cylinder and stored in a refrigerator until examined under a binocular microscope after removal of the rubber sheet. Thus specimens quite literally need never be handled by fingers or forceps during capture, transport, storage or examination – not until they are removed for more detailed examination or preservation. For this reason the apparatus has been termed a Single Operation Collecting Kit, abbreviated to SOCK, and respectfully designated an "Acadian SOCK" in deference to an institution that has fostered many a field biologist.

Some of the design presented in Figure 1 is rather refined. The shut-off valve in the spout is not really necessary because a vacuum effect limits the loss of water. It is basically to keep specimens from escaping, but they rarely find the opening, especially if the water



level is kept below the level of the spout. To lower the water level in a SOCK, the diaphragm can be pumped with the index finger and jets of water will be ejected from the spout and no specimens, if they are crawling mollusks. This apparatus was made specifically for collecting sacoglossan and nudibranch mollusks in the size ranges of < 2.5 cm. The O-ring and medium gauge dental latex can easily be substituted by a string and a piece of toy balloon or rubber glove. If you keep a few "Acadian SOCKs" in your car, then a complete collecting kit for sea shore or lake is always at hand and the expendable parts can be purchased or replaced afresh in the shopping center of even the smallest town.

My tide pool technique was to carry a basket loaded with 10 Acadian SOCKs. Each species of nudibranch collected was kept in a separate SOCK. If occasional nudibranchs were too large or some of the dorids too stiff, then the rubber was flipped off and the specimen dropped in with the others and the diaphragm replaced. Specimens to be collected must be submerged, but it does not matter if the SOCK has air or water or both in it. The SOCK can be partly in air and water or totally submerged. Specimens were scraped off the underside of overturned rocks with the SOCK spout (or forceps) and positioned in the aperture of the spout. The diaphragm was depressed and the spout submerged in the nearest pool of water, releasing the finger pressure at the same time. The mucoid blob from the rock surface, now submerged in sea water in the SOCK, would then assume its natural shape and was examined with a hand lens.

The principle employed in the Acadian SOCK apparatus is applicable to larger and smaller diameter spouts and cylinders. As long as the volume displaced by depressing the rubber lid is greater than that of the spout, then any small or delicate organism can be drawn back into the cylinder within a gentle stream of water. I have field-tested two sizes of SOCK apparatus in 7 countries since January 1968 and can attest to their effectiveness. In fact, I have had the pleasure of using SOCK apparatus with SCUBA gear in *Zostera* beds and in algal jungles. One need only shake specimens off the plants or epizoans and then leisurely "pick them out of the air" as they drift about; or pieces of plants or hydroids or polyzoans with attached nidosomes and adult nudibranchs can be broken off and sucked up together.

The uninterrupted hours necessary to evolve the design of the Acadian SOCK were made possible by a year of Sabbatical leave from Acadia University, and a Canadian National Research Council Senior Research Fellowship. The author is further indebted to Professor George Hughes, Chairman, Department of Zoology, Bristol University, England, for providing workshop facilities where the prototypes and present model were constructed.

Technique for Extraction and Mounting of Gastropod Radulae

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I HAVE USED the following procedure for extracting and mounting radulae for a number of years. It is largely a pragmatic technique developed by a process of trial and error.

The extraction procedure differs depending on the size and condition of the specimen from which the radula is to be extracted. If a dried specimen is to be used, it should be boiled in a saturated solution of trisodium phosphate (TSP). If the animal has dried deeply retracted into the shell such boiling in TSP will usually cause softening and swelling sufficient to allow it to be seen and removed from the shell. If the specimen is small, the entire animal is usually treated. If a large animal is used, the first step must be to remove the buccal mass, lying immediately behind the foot and head areas and just below the mantle cavity. The softened animal (or the buccal mass) is then boiled in a concentrated solution of sodium hydroxide for a short time (3 - 10 seconds), reducing it to a viscous brown film on the surface of the NaOH solution. This brown scum is removed by pipette and transferred to a watch glass with 70% ethanol. Gently swirling the watch-glass, while carefully viewing it under a dissection microscope will generally cause the brown film to dissipate and leave the radula as a highly refractive filamentous object. The radula is generally a ribbon-like structure which may be removed by the aid of needles, and stored in a vial of alcohol. If the radula of a toxoglossate species [Conidae, Terebridae, Turridae] is extracted, the radula may be a packet of tiny "darts."

The radula under microscopic scrutiny is transferred to a depression slide containing a drop of eosin stain and allowed to remain there until the drop has dried. Using a disposable hypodermic syringe the depression slide is carefully filled with 70% ethanol. When the radula has been sufficiently destained (5 - 10 minutes), the 70% ethanol is removed, using the hypodermic syringe, and replaced with 95% ethanol. The lightly stained radula is allowed to remain in the 95% ethanol for about 5 minutes, then transferred with needles to a slide with a drop of xylene or water-based mounting medium. Still viewing the radula under the dissection microscope, a small section of the radula is removed intact and segregated, the remainder